

Serial No.: 10/812,467
Office Action Date: 27 July 2006

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REMARKS/ARGUMENTS

This is in response to the Office Action issued on 27 July 2006, with claims 1-26 pending in the application. Claims 1-26 stand rejected. By this response to the Office Action, claims 1, 3, 10, 12, 18 and 20 have been amended. The specification has been amended in response to the comments in the Office Action and to address informalities therein. No new matter has been added by this response to the Office Action.

Drawings and Specification

The Office Action objected to the scale descriptor of the y-axis of Fig. 6. Paras. 0018 and 0036 of the specification are amended herein, in order to address the concerns stated in the objection.

Para. 0008 is amended herein to provide application serial number information of cited patents unavailable at the time of filing. No new matter has been added by these amendments.

Claim Rejections – 35 U.S.C. § 102(b)

Claims 1, 2, 4, 5, 10, 13, 18, 21, and 22 are rejected under 35 U.S.C. § 102(b) as being anticipated by Ito, et al, USPN 5,775,099 (*Ito*). Claims 1, 10, and 18 have been amended to more particularly point out and distinctly claim the subject matter of the invention.

Applicant respectfully traverses any rejection of Claims 1, 2, 4, 5, 10, 13, 18, 21, and 22 in view of *Ito* because *Ito* fails to teach or suggest all the elements of the claims, as is required under 35 U.S.C. § 102(b).

Newly amended claim 1 sets forth a method for controlling a direct injection internal combustion engine operable in a homogenous region of operation and a non-homogeneous region of operation, the engine including a NOx trap generally effective to accumulate NOx emissions during lean operation and to release accumulated NOx emissions during rich operation. The method comprises providing a first region of homogeneous engine operation during periods of engine operation

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wherein the accumulated NOx emissions are below a first predetermined threshold; and, providing a second region of homogeneous engine operation greater than said first region of homogeneous operation during periods of engine operation wherein the accumulated NOx emissions are not below said first predetermined threshold. The first and second regions of homogeneous engine operation comprise operating regions defined by engine speed and engine load. The operating regions are described in Para. 0023 of the specification and exemplary operating regions are depicted with reference to Figs. 3A and 3B of the invention. The first predetermined threshold comprises a fraction of capacity of the NOx trap, which is described in Para. 0022 of the invention.

Applicant respectfully asserts that newly amended claim 1 is distinguishable from *Ito* because *Ito* fails to teach or suggest providing first and second homogeneous engine operating regions defined by engine speed and engine load, as described and detailed above.

Ito teaches a method for controlling a direct injection internal combustion engine operable in a homogenous region of operation and a non-homogeneous region of operation, the engine including a NOx trap generally effective to accumulate NOx emissions during lean operation and to release accumulated NOx emissions during rich operation, wherein engine operation in the homogeneous region of operation is separated from operation in the non-homogeneous region of operation based only upon engine load, using depression L of the accelerator pedal 40 to represent load. (See, Fig 6, Fig. 7, and item 118 of Fig. 17). *Ito* discusses NO_x adsorption based upon engine speed and load (See, e.g., Col. 10, Lines 20-62), but neither teaches nor describes providing a first speed/load region and a second speed/load region of homogeneous engine operation, as is claimed and described in the instant invention.

Applicant respectfully asserts that newly amended claim 1 is further distinguishable from *Ito* because *Ito* fails to teach or suggest a first predetermined threshold that comprises a fraction of capacity of the NOx trap, as described and detailed above. *Ito* teaches only a single value for NO_x adsorption capacity, referred to as allowable value MAX, as shown by Y in FIG. 13. (See, Col. 11, Lines 20-29).

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Since *Ito* neither teaches nor describes the first predetermined threshold that comprises a fraction of capacity of the NOx trap, the invention of claim 1 is distinguishable and therefore allowable.

For at least all these reasons, Claim 1 is distinguishable from *Ito*, and therefore allowable.

Claims 2, 4, and 5 are each dependent upon now allowable claim 1, with further limitations, and are therefore patentably distinguishable from *Ito* for the same reasons as set forth with regard to claim 1, and are therefore allowable.

Claim 10 has been amended to more particularly point out and distinctly claim the patentable subject matter of the invention, consistent with claim 1. Newly amended Claim 10 sets forth a method for controlling regeneration of a lean NOx trap comprising: estimating an accumulated NOx in a NOx trap, and hastening regeneration of the NOx trap by reducing the size of a stratified charge operating region of the engine when the accumulated NOx exceeds a first threshold value and initiating regeneration when the stratified charge operating region of the engine is exited. Reducing the stratified charge operating region comprises reducing engine speed and engine load at which to operate the engine in stratified charge operating mode, which is neither taught nor described by *Ito*, as previously discussed with reference to claim 1.

Thus claim 10 is patentably distinguishable over *Ito* and therefore allowable.

Claim 13 is dependent upon now allowable claim 10, with further limitation, and therefore patentably distinguishable from *Ito* for the same reasons as set forth with regard to claim 10, and is therefore allowable.

Claim 18 has been amended to more particularly point out and distinctly claim the patentable subject matter of the invention, consistent with claim 1, and is therefore patentably distinguishable over *Ito* for the same reasons as set forth with

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regard to Claim 1.

Claims 19, 21, 22 are each dependent upon now allowable claim 18, with further limitations, and are therefore patentably distinguishable from *Ito* for the same reasons as set forth with regard to claim 18, and are therefore allowable.

Claim Rejections 35 U.S.C. §103(a)

Claims 6, 14, and 23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claims 5, 13, and 22 respectively, in view of Ishii, et al. (U.S. Patent Application 2002/0029562) ('*Ishii*').

Claims 6, 14, and 23 are each dependent upon now allowable claims 1, 10, and 18 respectively, with further limitations, and are therefore patentably distinguishable from *Ito* in view of *Ishii* for the same reasons as set forth with regard to claims 1, 10, and 18, and are therefore allowable.

Claims 3-9 and 20-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claims 1 and 18 respectively, in view of Wachi et al. USPN 6,763,657) ('*Wachi*') and *Ishii*.

Newly amended claim 3 is dependent upon now allowable claim 1, with further limitation and therefore patentably distinguishable from the cited art.

Furthermore, newly amended claim 3 sets forth the method for controlling the direct injection internal combustion engine, further comprising regenerating the NOx trap when the accumulated NOx emissions exceeds a second predetermined threshold greater than said first predetermined threshold. The second predetermined threshold comprises a fraction of the capacity of the NOx trap.

Applicant respectfully asserts that newly amended claim 3 is distinguishable from the cited are because *Ito*, *Wachi*, and *Ishii*, either alone or in combination, fail to teach or suggest regenerating the NOx trap when the accumulated NOx emissions exceeds a second predetermined threshold greater than said first predetermined threshold, and the second predetermined threshold comprising a fraction of the

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capacity of the NO_x trap. As pointed out in the Office Action, the disclosure of *Ishii* teaches a first and a second predetermined threshold (TNOAMX), but TNOAMX is defined as a NO_x saturated trapping quantity. (See, Para.0075). Applicants assert that the NO_x saturated trapping quantity taught by *Ishii* fails to anticipate the second predetermined threshold comprising a fraction of capacity of the NO_x trap, and thus claim 3 is distinguishable and therefore allowable.

Claims 4-9 are dependent upon one of allowable claims 1 or 3, with further limitations, and therefore allowable.

Amended claim 20 is allowable for the same reasons as set forth with regard to claim 3. Claims 21-26 are dependent upon now allowable claim 20, with further limitation, and therefore allowable.

Claims 11 – 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 10, in view of *Wachi*.

Claims 11-12 are dependent upon allowable claim 10, with further limitation, and therefore allowable.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Ito* as applied to claim 13, in view of *Gui*.

Claim 15 is ultimately dependent upon allowable claim 10, with further limitation, and therefore allowable.

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Conclusion

Based on the above, it is respectfully submitted that all claims 1-26 are in condition for allowance, and therefore, the same should be allowed to proceed to issue. If the Examiner has any questions regarding the contents of the present response the Applicants' attorney may be contacted at the phone number appearing below.

Respectfully submitted,



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